

A Study on the Physical Property of DTY for Car Seat Fabrics According to Spinning Conditions

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1. INTRODUCTION

Today's demand of automobile textiles is increased because automobile industry is expanded. And high performance materials are needed for automobile textiles. Especially, mechanical properties of PET dope dyed yarns such as friction resistance, formability, and light fastness are excellent, PET dope dyed filaments are used for car seat fabrics.¹⁾²⁾

This paper surveys the mechanical properties of PET dope dyed yarns for car-seat. For this purpose, PET POY 235d/48f is made on the melt spinning machine and then, draw textured yarn, DTY 150d/48f is made on texturing m/c. Totally, 27 kinds of PET DTY 150d/48f are prepared. The three kinds of spinning parameters such as spinning temperature, winder speed and opu are surveyed. The mechanical properties such as yarn count, wet and dry shrinkage and tensile properties such as tenacity, breaking strain and yarn evenness are measured and discussed with yarn spinning conditions. Finally, optimum spinning conditions are selected.

2. EXPERIMENTAL

2.1 Specimens

Table 1 shows spinning conditions of PET dope dyed yarns and Table 2 shows draw texturing conditions of PET dope dyed yarns.

Table 1. Spinning conditions

YARN MB	Sample No.	Spinning temp.	Winder speed	opu
235/48 POY VGRD5387	1	288 °C	3200rpm	0.40%
				0.45%
				0.50%
			3300rpm	0.40%
				0.45%
				0.50%
			3400rpm	0.40%
				0.45%
				0.50%
	2	293 °C	3200rpm	0.40%
				0.45%
				0.50%
			3300rpm	0.40%
				0.45%
				0.50%
			3400rpm	0.40%
				0.45%
				0.50%
3	295 °C	3200rpm	0.40%	

	3300rpm	0.45%	
		0.50%	
		0.40%	
	3400rpm	0.45%	
		0.50%	
		0.40%	
			0.45%
			0.50%
			0.40%

Note: OPU : oil pick up

Table 2. Draw texturing conditions

Machine	D/R	1st heater temp.	2nd heater temp.	winding speed
Teijin	1.65	300-320°C	235°C	600m/min

2.2 Measurements

Table 3 shows measurement method of mechanical properties of specimens.

Table 3. Measurement methods of physical properties of specimens

Items	Measuring equipment	Remark
Denier	Warp Reel	sample length : 90m KS K 0416
Thermal shrinkage	Dry-(heat chamber)	100°C, 30min.
	Wet-(Water bath)	100°C, 30min.
Tensile property	Testometric MICRO 350	sample length : 100mm test speed : 100mm/min. KS K 0520
Evenness	Uster 4 tester	KS K 0467

3. RESULTS AND DISCUSSION

Fig.1 shows denier of PET dope dyed yarns according to spinning conditions. It is shown that denier is not changed according to increase of winder speed, spinning temperature and opu.

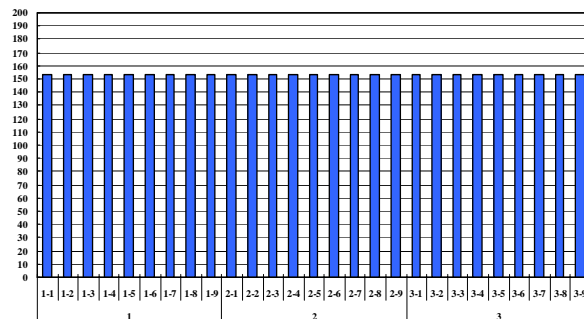


Fig. 1 Denier of PET dope dyed yarns according to spinning conditions

Fig.2 shows thermal shrinkage of PET dope dyed yarns according to spinning conditions. It is shown that

thermal shrinkage of PET dope dyed yarns are not changed according to increase of winder speed. The dry thermal shrinkage of PET dope dyed yarns are increased and then decreased with increasing opu values. But wet shirinkage is increased with opu.

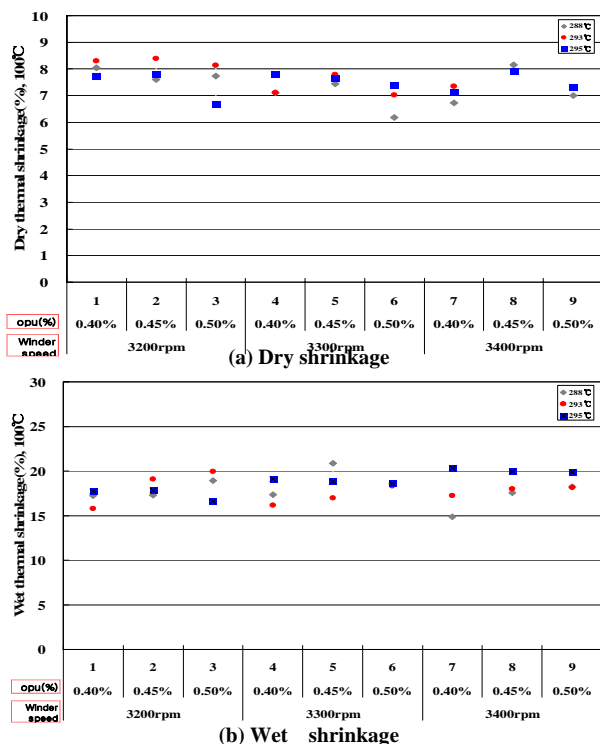


Fig. 2 Thermal shrinkage of PET dope dyed yarns according to spinning conditions

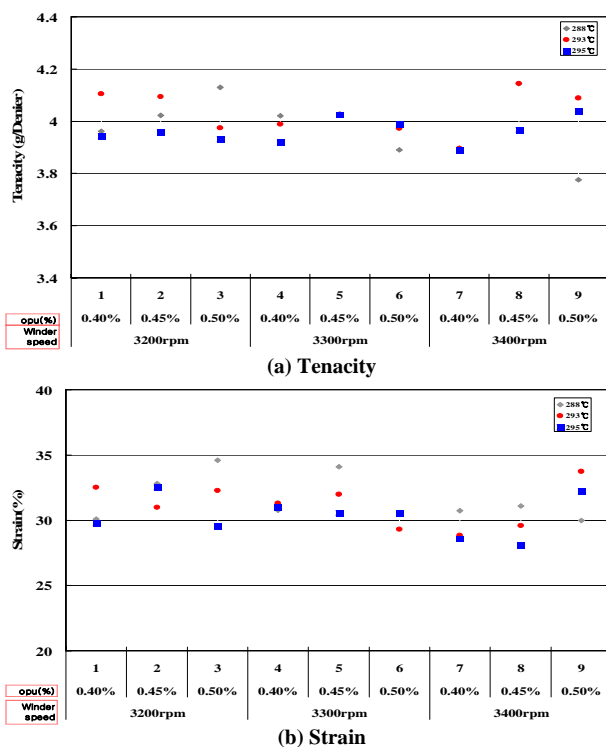


Fig. 3 Tensile properties of PET dope dyed yarns according to spinning conditions

Fig.3 (a) shows tenacity of PET dope dyed yarns according to spinning conditions. It is shown that tenacity of PET dope dyed yarns are higher about 0.5g/denier than those of PET dope dyed yarns with original spinning conditions. Tenacity is not changed according to increase of winder speed and spinning temperature but strain is changed according to increase of opu.

Fig.3 (b) shows strain of PET dope dyed yarns according to spinning conditions. It is shown that strain of PET dope dyed yarns 27 samples are higher about 2% than those of PET dope dyed yarns with original spinning conditions. Strain is not changed according to increase of opu and spinning temperature but strain is changed according to increase of winder speed.

Fig.4 shows evenness of PET dope dyed yarns according to spinning conditions. It is shown that evenness of PET dope dyed yarns 27 samples are under 1% value. It proved excellent values.

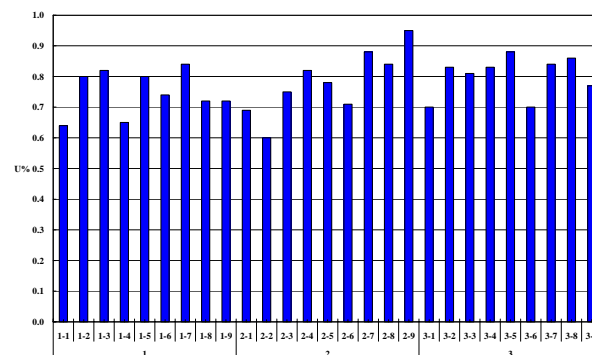


Fig. 4 Evenness of PET dope dyed yarns according to spinning conditions

4. CONCLUSIONS

The results were as follows :

Optimum conditions of spinning for car seat PET dope dyed yarns were as follows;

- No.1-6 : spinning temp. (288 °C), winder speed(3300rpm), opu(0.50%)
- No.1-7 : spinning temp. (288 °C), winder speed(3400rpm), opu(0.40%)
- No.1-9 : spinning temp. (288 °C), winder speed(3400rpm), opu(0.50%)
- No.3-3 : spinning temp. (295 °C), winder speed(3200rpm), opu(0.50%)

5. REFERENCES

- [1] A.R Horrocks and S.C Anand, "Handbook of Technical Textiles", The Textile Institute.
- [2] S.K. Mukhopadhyay and J.F. Partridge, "Automotive Textiles", Textile Institute, 1999